REMARKS

Claims 1-21 are pending in this application, with claim 1 being independent. For the reasons set forth below, Applicants respectfully submit that all pending claims are patentable over the cited prior art.

Objection to the Specification

The Examiner objected to the specification for minor informalities. Applicants respectfully submit that the amendments made to the specification overcome this objection.

Double Patenting Rejection

Claims 1, 4-5, 7-8, 12, 16-17, and 19-21 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 4-10 of copending Application No. 11/402,062. Since no allowable subject matter has been indicated, Applicants respectfully request that the Examiner hold this rejection abeyance.

Rejection under 35 U.S.C. § 103

Claims 1-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Linares et al. (US Pub. 2003/0131787) in view of Horikoshi Yoshiharu et al. (JP Pub. 02-252694). Applicants respectfully traverse these rejections for at least the following reasons.

The claimed subject matter was made to provide a large-sized and high-quality single crystal diamond having characteristics desirable for use of semiconductor device substrates and optical components. Applicants found that property having the phase difference produced when mutually perpendicular linearly polarized light beams pass through a single crystal diamond fall within a certain range in an evaluation method utilizing birefringent light is important in terms of

maintaining good properties as a semiconductor device substrate and good properties as an optical component (see, paragraph [0031] of the specification). The present subject matter was developed around this finding.

More specifically, the present subject matter is, as recited by claim 1, directed to a single crystal diamond grown by vapor phase synthesis, wherein when one main surface is irradiated with a linearly polarized light considered to be the synthesis of two mutually perpendicular linearly polarized light beams, the phase difference between the two mutually perpendicular linearly polarized light beams exiting another main surface on the opposite side is, at a maximum, not more than 50 nm per 100 μm of crystal thickness over the entire crystal. Further, the present subject matter is directed to a semiconductor substrate (claim 20) and an optical window (claim 21), both comprising the above single crystal diamond.

The claimed single crystal diamond is, as described in paragraph [0030] of the specification, obtained by a manufacturing method comprising steps of preparing a single crystal diamond substrate produced by vapor phase synthesis as a seed substrate, etching away one main surface thereof by reactive ion etching (hereinafter referred to as RIE), and then growing a new single crystal diamond layer on the main surface of the seed substrate by vapor phase synthesis. Preferably, the single crystal diamond substrate used as the seed substrate is separated from the single crystal diamond layer newly grown by vapor phase synthesis. Furthermore, the side surfaces of the diamond seed substrate can also be etched away by RIE prior to the step of etching away the main surface of the seed substrate, whereby more desirable properties can be ensured in the grown single crystal diamond. The results of the examples demonstrate that the single crystal diamonds grown by vapor phase synthesis on the seed substrate, which is prepared

by vapor phase synthesis and is subjected to RIE according to the present application, have the intended desirable properties.

Linares appears to disclose a single crystal diamond obtained by chemical vapor deposition (CVD) and application of this diamond to semiconductor devices, optical waveguides, etc. The single crystal diamond in Linares is obtained by a manufacturing method comprising the steps of a) forming a first synthetic diamond layer incorporating one or more impurities and one or more carbon isotopes on a substrate by a chemical vapor deposition process; and b) selecting concentrations of the one or more carbon isotopes and the one or more impurities during the formation of the first synthetic diamond layer, in order to form the first synthetic diamond layer with a predetermined lattice constant having a corresponding level of lattice strain (see, claim 1 of Linares). Linares appears to disclose that the properties of synthetic monocrystalline diamonds depend largely on the defects or impurities in the crystals and thus by controlling these factors, one can control not only the electrical properties but also other properties of the diamond (see, paragraph [0007] of Linares). In the manufacturing method of Linares, the kind and concentration of impurities to be doped and the process of doping are controlled for the intended properties.

As conceded by the Examiner, Linares fails to disclose using, as a means for evaluating the grown single crystal diamond, the phase difference produced when mutually perpendicular linearly polarized light beams pass through the diamond. Linares fails to disclose or even suggest that the phase difference of the mutually perpendicular linearly polarized light beams which have been transmitted through the diamond can be effectively used for evaluation of the characteristics of grown single crystal diamond. The Examiner then relies on Yoshiharu to remedy the deficiencies of Linares.

Applicants respectfully submit that Yoshiharu fails to cure the deficiencies of Linares. Yoshiharu appears to disclose a device of monitoring the epitaxial growth state of a semiconductor crystal such as GaAs on a substrate crystal placed on a vacuum container, wherein a light ray source is irradiated on the growth surface of the crystal with nonpolarized light ray, making the reflected light from crystal surface into homogeneous light, separating the homogeneous light into two different polarized light components, and analyzing the two polarized lights. Yoshiharu appears to disclose monitoring the crystal growth state by an optical means.

However, Yoshiharu fails to disclose the use of a polarized light as required by claim 1, because Yoshiharu expressly states that the grown crystal surface is irradiated with nonpolarized light ray (see, the abstract of Yoshiharu). Also, Yoshiharu fails to disclose the polarized light beams are measured after transmitting through the single crystal diamond because Yoshiharu uses the light reflected from the grown crystal surface (see, the figure of Yoshiharu). The phase difference specified in claim 1 is of the mutually perpendicular linearly **polarized** light beams transmitted **through** the single crystal diamond (see, paragraph [0046] of the specification), rather than the light reflected from the grown single crystal diamond as disclosed in Yoshiharu. Therefore, Yoshiharu also fails to disclose or suggest the evaluation method recited by claim 1. Further, Yoshiharu fails to mention the use of the monitoring device in the diamond crystal growth.

The Examiner asserts that "since Linares et al teaches a diamond made by the same method taught by applicant, vapor phase synthesis, Examiner takes the position that the product created by Linares' method will exhibit the properties claimed by applicant such as the phase

difference exhibited between two mutually linearly perpendicular polarized light irradiated on a surface of the crystal". Applicants respectfully disagree.

As mentioned above, the single crystal diamond of the present application is produced by the manufacturing method including: 1) a step of readying a single crystal diamond substrate produced by vapor phase synthesis as a seed substrate; and 2) a step of etching away one main surface thereof by RIE prior to growing a new single crystal diamond layer on the seed substrate. Preferably, the manufacturing method of the present application further includes 3) a step of etching away of the side surfaces of the seed substrate by RIE prior to the step of etching away the main surface by RIE.

In contrast to the applicants' manufacturing method, Linares does not teach or suggest the use of RIE in the above steps 2) and 3) and the effects thereof. Further, the seed substrate used in the manufacturing method of Linares may be chosen from among natural diamond crystals, synthetic high pressure diamond crystals or synthetic CVD diamond crystals (see, paragraph [0115] of Linares). Thus, there is no suggestion of the advantage of a seed substrate produced by vapor phase synthesis over natural diamond crystals and synthetic high pressure diamond crystals. Therefore, it is clear that the claimed single crystal diamond grown by vapor phase synthesis is obtained by a different manufacturing method from the manufacturing method disclosed in Linares, and thus has different properties in the phase difference measured by using the polarized light beams as recited by claim 1. This is evidenced by the Examples of this application. Samples B-D which are prepared by the above mentioned method including the steps of 1)-3) exhibit superior properties over those of comparative samples. More specifically, as discussed in paragraphs [0057] to [0060] of the specification, comparative samples (A and E) using a seed substrate without RIE have phase difference outside the range specified in claim 1

and their properties are far inferior in comparison with those of Samples B-D. Further, Samples F-I (natural diamonds) and Sample J-M (diamond made by high-temperature, high-pressure synthesis) are comparative examples because they are not diamonds produced by grown by vapor phase synthesis and outside the claimed invention. These comparative samples are also inferior to Samples B-D. Thus, the Examiner's assertion that Linares' diamond, made by the same method taught by the applicant, would have the claimed properties fails.

Based on the above, Applicants respectfully submit that the cited references Linares and Yoshiharu, taken alone or in combination, do not render claim 1 or any claims dependent thereon obvious. Thus, Applicants respectfully request that the Examiner withdraw the rejection of claim 1-21.

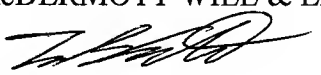
CONCLUSION

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP



Takashi Saito
Limited Recognition No. L0123

600 13th Street, N.W.
Washington, DC 20005-3096
Phone: 202.756.8000 BKS:TS:MaM
Facsimile: 202.756.8087
Date: February 11, 2009

Please recognize our Customer No. 20277 as our correspondence address.